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ABSTRACT

The pamphlet reviews research on creativity and applies it to the learning process. After discussing the definition and measurement of creativity, the components of creative performance are outlined, including domain-relevant skills, creativity-relevant skills, and intrinsic task motivation. Factors which destroy students' creativity are noted, such as having children work for an expected reward, setting up competitive situations, having children focus on expected evaluation, using plenty of surveillance, and setting up restricted-choice situations. Strategies for nurturing and encouraging intrinsic motivation and creativity in classroom settings are explored. A bibliography and a list of resources on thinking skills conclude the pamphlet. (PB)

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Creativity and Learning

by Beth A. Hennessey
Teresa M. Amabile

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Creativity and Learning

by Beth A. Hennessey
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THE STORY OF EINSTEIN

As a child Albert Einstein was slow and shy. He did so poorly in school that when his father asked what profession his son should adopt, the headmaster answered simply, "It doesn't matter. He'll never make a success of anything."

The German school over which this headmaster presided was regimented and highly militaristic. Einstein suffered terribly in this environment and complained bitterly about it in his autobiography:

> It is nothing short of a miracle that the modern methods of instruction have not yet entirely strangled the holy curiosity of inquiry; for this delicate little plant, aside from stimulation, stands mainly in need of freedom; without this it goes to wreck and ruin without fail. It is a very grave mistake to think that the enjoyment of seeing and searching can be promoted by means of coercion and a sense of duty. . . . This coercion had such a deterring effect upon me that, after I had passed the final examination, I found the consideration of any scientific problems distasteful to me for an entire year. (61, pp. 16–17)*

Partly in an attempt to escape from such a strictly regimented learning situation, Einstein left Munich when he was 15, hoping to enroll in the Polytechnic Institute in Zurich. To his dismay, however, he failed the entrance examination and was required to attend a Swiss school for remedial coursework. According to one analyst (33), this journey to Switzerland represented a turning point in Einstein's schooling and, perhaps, in his scientific thinking as well.

In sharp contrast to what he had known, this new school was humanistic in orientation, stressing above all else the individual's need to search for knowledge unencumbered. Such an academic atmosphere ideally suited Einstein's independent style of working and thinking. There was little emphasis on memorization and much emphasis on individual laboratory work, student-initiated investigation, and the development of relaxed, democratic exchanges among students and teachers.

To the end of his life, Einstein remembered his years at this school fondly: "It made an unforgettable impression on me, thanks to its liberal spirit and the simple earnestness of the teachers who based themselves on no external authority" (33, p. 106). Importantly, it was at this school that Einstein devised the first *Gedankenexperiment* that would lead him to the theory of relativity.

Einstein's experiences are not unique. Many widely recognized creative individuals report that their interest in their work and their creativity have been greatest when they concentrate on the work itself, and not on

*Numbers in parentheses appearing in the text refer to the Bibliography beginning on page 27.

externally imposed directives (3). A number of these reports include accounts of classroom experiences, as did Einstein's. They suggest that many of the features we as educators routinely build into the school day might, in fact, destroy students' motivation and undermine their creativity. Our own research and that of others tell us that this is, in fact, the case.

THE INTRINSIC MOTIVATION PRINCIPLE OF CREATIVITY

The model from which we work states that there is a direct link between the attitude an individual brings to a task—his or her motivational orientation—and the creativity of his or her performance. This relationship between motivation and creativity is stated formally as what we call the *intrinsic motivation principle of creativity*: the instrinsically motivated state is conducive to creativity, while the extrinsically motivated state is detrimental (3, 4).

The environment, or at least certain aspects of the environment, determines motivational orientation. Individuals who undertake a task for its own sake are intrinsically motivated. They perceive themselves as engaging in an activity primarily because of their own interest in it, and the completion of that activity is their primary goal. Extrinsically motivated individuals, on the other hand, undertake a task because they view it as a means to some external goal. It is this extrinsic approach, this orientation to environmental constraints outside the task itself, that undermines creativity.

This proposition has certain intuitive appeal. As early as 1954, Carl Rogers talked about the "conditions for creativity" and the importance of setting up situations of psychological safety and freedom, of providing a climate in which external evaluation is absent (3, p. 75). As we have seen with Einstein, creative individuals also express this recurrent message (3, 60). And in addition to this anecdotal evidence, a large body of literature from the field of social psychology links the imposition of environmental constraints to reductions in intrinsic motivation and accompanying decrements in creativity of performance. After discussing the measurement of creativity, we will describe some of these findings and their implications for the classroom.

THE DEFINITION AND MEASUREMENT OF CREATIVITY

What do we mean by creativity? Psychologists have approached this problem of definition from a variety of angles. In the past, they tended to center their discussions around either the creative person or the creative

process. Although today many theorists continue to think of creativity as a *process*, their definitions most frequently cite characteristics of the *product* as the distinguishing signs of creativity.

Bruner, for instance, views the creative product as anything that produces "effective surprise" in the observer as well as a "shock of recognition" that the product or response, while novel, is entirely appropriate (12). This combination of novelty and appropriateness forms the basis for our own conceptualization of creativity as well:

> A product or response will be judged as creative to the extent that (a) it is both a novel and an appropriate, useful, correct, or valuable response to the task at hand, and (b) the task is open-ended with more than one way of doing it.

Tied to this issue of how best to define creativity is the question of assessment: How do we measure creativity? The vast majority of researchers in this area have relied on creativity tests. These tests can be grouped into three broad categories: personality inventories, biographical inventories, and behavioral assessments. Behavioral assessment tests, which are similar in both form and administration to conventional intelligence scales, are chosen most often for classroom use.

The Remote Associations Test (RAT), which asks the test taker to find connections between two or more items, has been administered at the college level (44). Guilford's Unusual Uses Test (29), which requires the subject to name as many uses as possible for a common object (such as a brick), is available for testing children. By far, the most widely used creativity tests are the Torrance Tests of Creative Thinking (TTCT), also called the Minnesota Tests of Creative Thinking (68). The TTCT are, in fact, the criteria against which many other creativity tests have been validated.

The TTCT call for oral, written, and drawn responses, which can be scored separately by category or combined into a single creativity score. Test administration follows a standard procedure. Children (for whom the TTCT were originally designed) are usually given the tests in a group by their teacher, with fairly stringent time limits. Instructions given to the children suggest that correct responses are those that are unusual and clever. Answers to test items are scored in terms of four criterion components: (1) fluency, the production of a large number of ideas; (2) flexibility, the production of a large variety of ideas; (3) elaboration, the development, embellishment, or filling out of ideas; and (4) originality, the use of ideas that are not obvious or banal, or that are statistically infrequent.

The TTCT and similar tests are very useful tools for researchers and classroom teachers who wish to assess childrens' creative abilities. They have been particularly helpful in situations in which the gifted are to be

identified for placement in enrichment programs, advanced classes, etc. Yet, these standard tests do not meet the needs of both psychologists studying situational influences on children's creativity and educators wishing to examine creativity within individual classrooms or small samples of children.

Because we study creativity not as an enduring trait but as a behavior sensitive to a number of situational factors, we have found that the traditional paper-and-pencil approaches to creativity assessment do not fill our research needs. While measures such as the TTCT are designed to identify relatively stable differences in children's creative abilities, we require a means of detecting the relatively unstable influences of environmental variables.

To meet this need, we have devised a measurement technique we call the *consensual assessment of creativity* (2), which allows us to compare the creative performance of individuals across a wide variety of situations. This technique grew from a specific operational definition of creativity that relies on the consensus of experts: a product or idea is creative to the extent that expert observers agree it is creative.

In our own investigations with children and with adults, we implement this consensual assessment procedure as follows: A subject is asked to complete some task in a specific domain (such as poetry) and then experts in that domain (such as poets) independently rate the creativity of the product. The level of interjudge agreement is assessed, and, if it is acceptable (generally above .70), the mean across-judge creativity rating is used as our measure of creativity.

A description of how we assessed creativity in one of our studies illustrates this method (7). In this study, elementary school students told stories to accompany an open-ended picture book with no words. After looking through the illustrations once, the children were asked to go through the book a second time, saying "one thing" about each page. All the stories were tape-recorded and transcribed. Three elementary school teachers familiar with the abilities of children in this age group then rated the products. These judges were asked to rate the stories relative to one another, using a seven-point scale and their own subjective definitions of creativity. Never was creativity defined for them, nor did they have the opportunity to confer among themselves concerning possible criteria for making such assessments. The level of agreement (reliability) among judges was extremely high, and the sum of their ratings was computed for each product. In this way, we were able to directly assess the effects of the different environmental conditions under which we had the children work in this study; we simply compared the mean creativity ratings of products produced under the various conditions. (See Amabile [2] for more details on the use of the consensual assessment technique.)

We think that methods of assessing creativity have important implica-

tions for the ways in which teachers *think* about creativity. If a teacher believes that there are large differences among children in terms of creative abilities, and if s/he wishes to measure these differences reliably, then the standard paper-and-pencil creativity tests can be very useful. When a teacher is more interested in the day-to-day fluctuations in children's creative performance on real classroom activities, however, the consensual assessment technique might be more applicable.

Teachers can simply take samples of children's work and, perhaps after soliciting the opinions of other teachers, chart the ups and downs in the children's creativity. Teachers *are* the experts in the domain of children's work; they know creativity when they see it. They can detect differences and changes in children's creativity, and they should have the confidence in their ability to do so.

THE COMPONENTS OF CREATIVE PERFORMANCE

But what does it mean when a child scores high (or low) on a creativity test or task? Is it appropriate, for example, to consider high scorers as "creative persons"? It is an underlying assumption of the majority of behavioral inventories that creativity is an enduring, if not in-born, characteristic similar to IQ or other individual difference variables. This view has, in fact, provided the major impetus for creativity research over the past three decades.

Psychologists, primarily concerned with defining the "creative personality," have concentrated on describing the social characteristics of famous or widely recognized creative people or on describing the differences in personality and intellect between people who do well on creativity tests and those who do not. In contrast with this approach, we seek to identify particular social and environmental conditions that can positively or negatively influence the creativity of most individuals.

Our conceptual model views creativity not as an innate characteristic but as a variable aspect of performance; in other words, creativity is viewed as depending on both temporary states and enduring traits. We maintain that all persons have creative potential. Whether or not this potential will be realized is, we believe, determined by the intersection of three major factors: domain-relevant skills, creativity-relevant skills, and intrinsic task motivation.

Domain-Relevant Skills

Domain-relevant skills can be considered the basis for any performance in any given area. This component, which includes factual knowledge,

technical skills, and special talents, can be seen as the set of cognitive pathways one can take to solve a given problem or do a given task. Some of the pathways are more common, well practiced, or obvious than others, and the set of pathways can be large or small. The larger the set, the more numerous the alternatives available and the greater the possibility of producing something new, of developing a new combination of ideas.

Domain-relevant skills depend on education, experience, in-born talent, and basic intelligence. In our view, nearly everything in most current school curricula is directed toward the development of domain-relevant skills—toward the teaching of facts in particular domains and the exercise of basic intelligence. These domain-relevant skills are, of course, assessed by traditional schoolwork and testing.

Creativity-Relevant Skills

The perennial question has been, Are creativity and intelligence basically the same thing, or are they not? A number of studies (25, 71) have shown that persons with low levels of intelligence almost uniformly have low levels of creativity. However, those with higher levels of intelligence exhibit *all* levels of creativity. Here, the correlation between IQ and creativity is quite low.

Our model suggests that intelligence is but one component of creative ability, a necessary, but not sufficient, factor. Some minimal level of intelligence is required for creative performance; however, a number of factors that would not be measured by traditional intelligence tests are also necessary for creativity. Some of those factors are creativity-relevant skills.

Creativity-relevant skills constitute the "something extra" of creative performance—cognitive style, exploration of new cognitive pathways, and working style. Creativity-relevant skills include personality dispositions conducive to deep levels of concentration or uninhibited risk taking.

All the research on "creative personality" is relevant here. In addition, a few investigators have explicitly studied the thinking styles associated with creativity. For example, Newell, Shaw, and Simon (50) offer a relatively sophisticated description of the creative process linked to computer-based notions of human intellectual abilities. Most other work on the cognitive skills that are involved in creativity is somewhat less theoretical, relying on common-sense notions of the creative process and, occasionally, on empirical findings from industry and education. The most familiar example in this category, Osborn's (52) "brainstorming" program, is prototypical: Sets of rules or heuristics are taught as guidelines for the generation of creative problem solutions. Subsequently, the ideas generated by people who have been trained in the program are compared with those of people who have not been.

Most creativity tests used in schools, such as the TTCT, mainly address creativity-relevant skills. These tests assess a child's basic ability to take new perspectives on problems, to come up with many unusual ideas, and to use his or her imagination in new ways.

Intrinsic Task Motivation

The third component of creativity—intrinsic task motivation—has been the most neglected in the classroom. Intrinsic task motivation includes motivational variables that determine an individual's approach to a given task. The first two components of creativity (domain-relevant skills and creativity-relevant skills), which have been the focus of most creativity research, can be considered "trait" factors. This third motivational component, which has been the primary focus of our research, depends heavily on temporary situational or "state" factors.

Perceptions of one's own motivation for undertaking a task depend largely on external social and environmental factors—specifically, the presence or absence of extrinsic constraints in the social environment. Extrinsic constraints are defined as factors that are extrinsic to the task itself. In other words, they are not essential for task performance but are introduced by other people as a means of control. Our own investigations tell us that such extrinsic constraints can decrease intrinsic motivation and, as a result, decrease creativity.

HOW TO KILL CREATIVITY

The hypotheses guiding most of our research are (1) that persons assigned to conditions of social constraint will perform with an extrinsic motivational orientation, and (2) that their products will, on the average, be significantly less creative than will be those of persons assigned to no-constraint conditions. Over the past ten years, we have gathered substantial evidence to support these propositions—evidence that can be summarized in terms of five reliable methods for killing creativity.

Have Children Work for an Expected Reward

As teachers, each one of us has offered children a reward for accomplishing some task. We set up these reward contingencies because we believe that they will motivate our students to work to the best of their ability. Of all the methods for killing creativity, this one has received the most attention. Its counterintuitive nature has fascinated investigators for quite some time now, and the evidence is clear. The expectation of reward can actually undermine intrinsic motivation and creativity of performance.

Without a doubt, the reward that has received the greatest amount of attention has been monetary payment. Yet, this is not the only form of reward that has had negative effects. A wide variety of rewards has now been tested, and everything from good-player awards to marshmallows produces the expected decrements in intrinsic motivation and creativity of performance.

Earlier investigations concentrated on the effects of reward on motivation, and each points to the same conclusion: for students who initially display a high level of interest in a task, an expected reward decreases their motivation, undermines the globally assessed quality of their performance, and makes them much less likely to take risks or to approach a task with a playful or experimental attitude.

However, creativity appears to result from just this sort of risk taking and uninhibited exploration (3, 9, 14, 18, 21, 39, 64, 65). For this reason, a number of recent studies have focused specifically on the effect of reward on creative aspects of performance.

One of the earliest investigations of this type was conceived by Kruglanski and his colleagues (36). Israeli high school students who either had or had not been promised a reward (a tour of Tel Aviv University's psychology department) were given two open-ended creativity tasks. Subjects were required (1) to list as many titles as possible for a literary paragraph and (2) to write their own stories, using as many words as possible from a 50-word list. When two independent judges rated the originality of these products, a clear and statistically significant superiority among unrewarded students emerged. In addition, nearly significant differences were found between the two groups on two intrinsic interest measures: the subjects' expressed enjoyment of the activities and their willingness to volunteer for further participation.

In one of our own investigations (7, Study 1), children assigned to a reward condition promised to tell a story in order to first have a chance to use an instant camera. Children in a no-reward condition were simply allowed to use the camera before they told the story; there was no connection established between the two activities. Elementary school teachers familiar with children's writing applied the consensual creativity assessment technique (2), with a high level of interjudge reliability. Results indicated that, overall, children in the no-reward condition told more creative stories than did children in the reward condition.

Set Up Competitive Situations

If you want to be absolutely certain that your students' motivation and creativity will be undermined, set up a situation in which they must compete among themselves for some desirable reward or other form of recognition.

In another of our studies (3), we did exactly that. In this instance, the experimental task was designed to measure artistic creativity. Girls ranging in age from 7 to 11 years were invited to one of two "art parties." All subjects participated in a variety of games and activities, and then were told that it was time to make a paper collage. Girls attending the Sunday party (the experimental group) believed that they were competing to win desirable prizes. It was explained to this group that after they had finished making their collages, the adults present would decide who had produced the "best" designs and would award the prizes accordingly. Girls attending the Saturday party (the control group) made their collages in a noncompetitive environment; they were told that the items they saw in the front of the room were door prizes. Artist-judges rated each collage on creativity, with a high interjudge reliability. They rated the control group significantly higher than the experimental (competitive) group on creativity of collages.

Have Children Focus on Expected Evaluation

In light of the research findings already reviewed, this warning about the deleterious effects of expected evaluation should come as no surprise. When faced with an upcoming evaluation of their performance, students are likely to adopt an extrinsic motivational orientation. Their focus is turned away from the intrinsically enjoyable aspects of the task itself, and the creativity of their performance is undermined.

The art party competition described above demonstrates the damaging effect of expected evaluation on children's artistic creativity. In three separate studies (1, 6), we have found that college students who were expecting an evaluation of their work produced significantly less creative collages or poems than did subjects in control conditions—i.e., no evaluation was expected.

Finally, Berglas, Amabile, and Handel (11) evaluated the effect of prior evaluation on children's subsequent creativity. They predicted that highly salient evaluation on one task would lead children to expect evaluation on a later task with the same experimenter and, as a consequence, would lower their creativity on that later task. All subjects, boys and girls in grades 2 through 6, made two art works. The first involved painting with a spinning disk and the second—which was the target task—involved making a paper collage. Experimental-group children were positively evaluated on their "spin art" before they made their collages. Control-group children simply made the two art works with no evaluation. Creativity results indicated that the control group was clearly superior to the experimental group. In other words, prior evaluation had an overall negative impact on creativity of performance—even though the evaluation was positive.

Use Plenty of Surveillance

In some instances, even unspoken evaluations of performance have had negative consequences. The mere presence of a watchful audience can be all it takes to undermine intrinsic interest and creativity of performance. If you want to lessen your students' chances of coming up with creative solutions, make your presence felt at all times. Watch their every move, and shift their focus away from the task at hand and toward your implied evaluation of their progress.

In 1975 Lepper and Greene (37) investigated the effects of such surveillance on the intrinsic interest of preschoolers. The knowledge that they were being watched via video cameras significantly undermined the children's intrinsic motivation for solving puzzles. Pittman and his colleagues (57) have since extended these findings by demonstrating that direct surveillance by another individual also decreases children's intrinsic motivation for a play activity.

One of our own investigations examined the effects of an evaluative audience on creativity. In one condition, college-age subjects believed that their collage making was being evaluated (via a two-way mirror) by a group of artists. In another condition, subjects worked only under the expectation of an upcoming evaluation. In a third condition, subjects believed that they were being watched by a nonexpert audience. And, finally, subjects in a control condition worked with neither an audience nor an expectation of evaluation. Our results showed that both evaluation expectation and the presence of an audience can undermine creativity, perhaps because the mere presence of a watchful audience *implies* evaluation (3).

Set Up Restricted-Choice Situations

There is little research on how children's creativity might be affected by restricting their choices of how to do an activity. The intrinsic motivation principle of creativity, of course, would suggest that such restrictions should undermine creativity.

In a preliminary test of the effects of choice on creativity (5), nursery school children were asked to make a paper collage. Children assigned to the choice condition were allowed to choose any 5 out of 10 boxes of materials to use in this task. An experimenter made the selections for the children in the no-choice condition. All subjects then completed their collages, which were rated on creativity by artists. As predicted, there was a substantial difference in collage creativity. The collages made by subjects in the choice condition were judged significantly more creative than were those made by subjects in the no-choice condition.

Two weeks after this initial session, a behavioral measure of subsequent

intrinsic interest in the collage activity was obtained. Over a three-day span, leftover materials were made available, and each child's engagement in the collage activity during free-choice periods was timed. Our results indicated that children in the choice condition did, in fact, spend somewhat more time with collage materials during free play than did children in the no-choice condition.

A WORD OF CAUTION

Social-environmental factors can have a profound effect on students' intrinsic motivation and performance, as these five reliable methods for killing creativity in the classroom show. Yet, extrinsic constraints need not always be detrimental to performance. It must be emphasized that we are speaking here only of open-ended, creative tasks—tasks for which there is more than one possible approach or problems for which there is more than one possible solution. When there is only one correct solution and creativity is not the goal, the imposition of extrinsic constraints, such as expected evaluations or rewards, can actually *improve* performance of the task.

However, we believe that in the classroom, intrinsic motivation is always preferable. There is plenty of evidence that intrinsic motivation leads to better problem solving and a deeper level of conceptual understanding (43). In the classroom, extrinsic motivation will consistently lead to better performance only on tasks requiring rote recitation, precise performance under strong time pressure, and the completion of familiar, repetitive procedures. We would argue—and so would many classroom teachers—that these are not the best situations for children's learning. There is no question that they are not the best situations for children's creativity.

A MAZE METAPHOR

Why should motivation influence creativity? Imagine that a task is like a maze that you must somehow get through. Assume that there is only one entrance to the maze and only one very clear and straight path leading to a single exit. This path is some procedure that you have learned for doing the task, one that is quite familiar and well practiced. It leads you to the exit, and the task is completed. Factory employees, assembly line workers, and bank tellers all engage in this sort of activity. Research has shown that the imposition of constraints, such as reward or evaluation contingencies, can actually speed up production and improve performance on these so-called "algorithmic" tasks (43).

Contrast this first description with a second maze configuration. Here also you find one entrance and one very clear and straight path leading to

an exit that is a viable end to the task or solution to the problem. Again, this is the algorithm you have learned for doing the task. What differentiates this maze, however, is the fact that there are now a number of possible exits—a number of solutions. You are faced with a much more open-ended type of task, and while the solution at the end of the clearly worn path is acceptable, it is also uncreative; it is not novel or elegant, nor does it provide insight or move things along in the domain. You cannot reach the other exits from the maze, which are likely to be more creative solutions, by following the algorithmic pathway. You can discover these other paths only by deviating from it, by exploring through the maze, by developing heuristic approaches to the task. You must not only explore but also take risks. And because this type of maze contains more dead ends than exits, the probability of your getting caught in one is high. Therefore, your exploration must be flexible enough to permit you to retrace your steps and reformulate your plans.

The point is this: if you are extrinsically motivated, your motivation comes primarily from something outside of the maze—a promised reward, an external evaluation, or the like. Under these circumstances, the most reasonable thing you can do is follow the familiar algorithm. You reach the usual exit with a minimum of fuss; you complete the task satisfactorily; you achieve the extrinsic goal. If you are intrinsically motivated, though, *you enjoy being in the maze*; the exploration and risk taking are intrinsically rewarding. Only if you have an intrinsic interest in the activity itself, *and* only if your social environment allows you to retain that intrinsic focus, will you be able to discover a truly creative solution.

It is especially important for children to hold onto the intrinsic enjoyment of learning that they are all born with. They must, at an early age, feel free to playfully explore through the various "mazes" of tasks before them. Seymour Papert, inventor of the Logo computer programming language, has argued that true intrinsically motivated exploration is the only way for children to really learn (53). If children get into the habit of exploring the problems before them—instead of solving the problems routinely like rats in a maze—they might just carry this "creativity habit" into their adult lives.

A MORE POSITIVE APPROACH

Thus far, we have been taking what might be termed a "negative approach" to the investigation of creativity. As researchers, we have found that it is much easier to demonstrate how to "kill" intrinsic motivation and creativity than it is to specify how intrinsic motivation and creativity might be nurtured and encouraged in the classroom setting. Yet, in our attempt to confirm a definitive link between creativity and intrinsic motivation, it is just as important that we demonstrate that creativity will be maintained

when intrinsic motivation is maintained as it is that we demonstrate that creativity will be undermined when intrinsic motivation is undermined. Practically speaking, when we consider the concerns of teachers and parents, it is more important that we do so.

In cooperation with Barbara Grossman, we recently set out to determine whether we could "immunize" children against the usually deleterious effects of reward through special training sessions that directly address motivational orientation. In the first phase of this experiment, students in grades 3, 4, and 5 were randomly assigned to one of two conditions: intrinsic motivation training or control—both of which were run by the same female experimenter.

In the intrinsic-motivation training condition, the subjects watched videotapes of two attractive 11-year-old children talking with an adult about various aspects of their schoolwork. The scripts for these tapes had been specifically written so that the boy and girl on the tape would serve as models of highly intrinsically motivated individuals. We addressed two primary goals through these intrinsic-motivation training tapes. Our first goal was to get the subjects to focus on intrinsic reasons for doing school work and to concentrate on those aspects for maximal enjoyment. The following is a tape segment that addresses this issue:

> *Adult*: Tommy, of all the things your teacher gives you to do in school, think about the one thing you like to do best and tell me about it.
>
> *Tommy*: Well, I like social studies the best. I like learning about how other people live in different parts of the world. It's also fun because you get to do lots of projects and reports. I like doing projects because you can learn a lot about something on your own. I work hard on my projects, and when I come up with good ideas, I feel good. When you are working on something that you thought of, and that's interesting to you, it's more fun to do.
>
> *Adult*: So, one of the reasons you like social studies so much is because you get to learn about things on your own. And it makes you feel good when you do things for yourself; it makes it more interesting. That's great!

Our second goal was to give the subjects practice in cognitively distancing themselves from socially imposed extrinsic constraints—to get them to focus instead on the inherently enjoyable aspects of a task in an effort to maintain their intrinsic motivation in the face of such factors as reward and evaluation. For example:

> *Adult*: It sounds like both of you do the work in school because you like it, but what about getting good grades from your teacher or presents from your parents for doing well? Do you think about those things?

Tommy: Well, I like to get good grades, and when I bring home a good report card, my parents always give me money. But that's not what's really important. I like to learn a lot. There are a lot of things that interest me, and I want to learn about them, so I work hard because I enjoy it.

Sarah: Sometimes when I know my teacher is going to give me a grade on something I am doing, I think about that. But then I remember that it's more important that I like what I'm doing, that I really enjoy it, and then I don't think about grades as much.

Adult: That's good. Both of you like to get good grades, but you both know that what's really important is how you feel about your work, and that you enjoy what you are doing.

In small groups of three to five, children met with the experimenter for 20-minute training periods on two consecutive days. During each intrinsic-motivation training session, segments of the videotape were shown, interspersed with directed discussion. During these discussions, the children were asked to relate what they had seen on the tape, to answer for themselves the questions the adult had posed, and to give their own reactions to Tommy's and Sarah's responses. Throughout, the experimenter offered interpretations of the tape and the children's commentary, and shared her own ideas, all with the aim of making the subjects more aware of intrinsic motivation and methods of coping with extrinsic constraints. At the close of each of these brief meetings, she asked the children to complete a series of short exercises in which they indicated their preference for a variety of school activities and described their feelings when performing their favorite tasks.

Subjects assigned to the control group also met in small groups over a two-day period for the purpose of viewing videotapes. In this case, however, the videotape discussions centered around Tommy's and Sarah's favorite things—foods, movies, animals, etc.

In summary, then, all subjects participated in some form of group activity. All met with the experimenter, saw videotapes, and participated in group discussions. What differentiated the conditions was the focus of these sessions: intrinsic motivation versus issues irrelevant to intrinsic motivation.

In the second phase of this experiment, after the training sessions had been completed, each child met individually with a different experimenter for testing. (The children's teachers and the experimenters were careful to avoid mentioning any connection between the training and the testing sessions, and denied a connection if any of the children inquired.) The Harter Scale of Intrinsic Versus Extrinsic Orientation in the Classroom (31) was administered, and two dimensions of classroom motivation were

assessed. These two dimensions, each having an intrinsic and an extrinsic pole, were (1) curiosity/interest versus pleasing the teacher/getting good grades and (2) independent mastery versus dependence on the teacher.

After this, a reward manipulation was introduced. Following a procedure used in an earlier study (7, Study 1), half of the children in each of the two training conditions were told that they could take two pictures with an instant camera if they promised to later tell a story to the experimenter. For the remaining children, this picture taking was presented simply as the first in a series of "things to do." The major dependent measure—creativity on a story-telling activity—also paralleled that employed in a previous investigation (7, Study 1). As a final task, all the subjects took the Unusual Uses Test of the Torrance Tests of Creative Thinking (68).

We predicted that subjects who had been trained to deal effectively with extrinsic constraints and to focus on intrinsic reasons for doing work in school would show overall increases in intrinsic motivation. We, in fact, found differences between the Harter Curiosity Scale scores for children in the two treatment conditions. Children receiving intrinsic-motivation training scored higher than did subjects in the control condition.

In addition, an examination of story creativity revealed the predicted interaction between training condition and reward manipulation. As expected, the reward significantly decreased the creativity of the children in the nonmotivational training group. By contrast, students in the intrinsic-motivation training group who were rewarded for their participation told stories that were judged significantly *more* creative than were those told by the no-reward intrinsic motivation group. It would seem that, as a result of their training, the former group of children had learned to treat reward not as an element that detracts from intrinsic interest but as something that can actually *add* to overall motivation. They had learned to overcome the deleterious effects of reward—so much so that their levels of intrinsic motivation (and, therefore, their levels of creativity) actually seemed to have increased.

How can we explain the fact that those children who had received intrinsic-motivation training exhibited higher creativity when rewarded than when not rewarded? Perhaps the answer lies in their interpretation of the reward manipulation and the story-telling activity. Perhaps our intrinsic-motivation training sessions had caused these young subjects to perceive their situation differently in some crucial way than did the control and the no-reward motivational training groups.

We conveyed through our videotapes and guided discussions that external rewards, such as good grades or money from parents, were nice, but what was really important was that one truly enjoy what one is doing. In essence, what we had attempted, and evidently accomplished, was to develop a salient intrinsic orientation, or a more solid internal locus of control, in our subjects. Thus, the subjects who did not receive intrinsic-

motivation training probably perceived the reward manipulation as strongly controlling, while the trained subjects most likely did not.

The results of our training study, while not completely clear, are at the same time extremely encouraging. If we, virtual strangers with only 40 minutes or so to spend with our subjects, could have this significant an impact on their motivational orientation and creativity, it is exciting to think what kind of changes classroom teachers might effect by building similar discussions into their normal classroom routine.

ADDITIONAL RESEARCH

Open Versus Traditional Classroom Environments

Thus far, we have reviewed research pertaining to a variety of environmental constraints and their negative impact on intrinsic interest and creativity, and we have demonstrated the potential benefits of intrinsic-motivation training sessions. What other areas of investigation might be informative to the classroom teacher who wishes to optimize student creativity?

A great deal of attention has been given to comparing the creativity of children enrolled in open and in traditional classrooms. Since one of the core concepts of open education is to give students control over the learning process, it has generally been assumed that open classrooms are more conducive to creativity than are more traditional environments. Children who have the freedom to construct their own educational program are believed to be more intrinsically motivated (and, thus, more creative) than are their constrained peers. A survey of the literature provides at least partial support for this hypothesis.

Open-classroom children have scored higher on open-ended design-making tasks (42), on originality and fluency as measured by a puzzle-solving test (35), and on two of the four Guilford tests (67). Interestingly, responses on self-rating questionnaires indicate significant differences in the working styles of children from the two types of classrooms. Sullivan (67) reports that children in open classrooms rate themselves as more likely to do their homework alone, make things without help from others, leave something unfinished because they become interested in something else, ask for help in following directions, prefer to have no set plans for the school day, and build something as they go along (rather than planning everything in advance).

In a study conducted by Ogilvie (51) five schools were ranked from most to least open. The data revealed that students in the "mid-road" schools received the highest creativity scores, while students in the highly

structured (traditional) schools and the highly unstructured (open) schools exhibited only moderate creativity. Several other studies have found that open education is associated with higher creativity scores (8, 30, 42) and that these effects are long term (30).

Yet, other investigators report mixed results, with open-education pupils scoring higher on some creativity tests and traditionally educated students scoring higher on others (41, 58). In another investigation (73), researchers found that pupils in a school in which the open plan had been in place for six years earned higher divergent (creative) thinking scores than did students in traditional classes, but that students in a school that had only recently adopted an open-education methodology scored considerably lower. Still other studies reveal that open education has no effect on children's creativity of performance (24, 70, 74), and only one investigation (72) has found that traditional approaches to education are more effective in fostering creativity in children (though this effectiveness was determined by observing one group of students, of above-average ability, working on figural tests).

In a comprehensive review of the open-education literature, Rejskind (59) observes that most investigations conducted prior to 1975 report that open education enhances at least some aspect of creativity, while most studies since then do not. Some theorists (26, 34) have suggested that this discrepancy can be traced to faulty methodological practices and/or definitional problems—i.e., what is an open classroom, and are all experimenters employing the same definition? Rejskind feels that recent changes in educational practice are more likely the cause of this disparity.

The earlier reports generally compare teaching styles that had evolved in English schools in the 1960s. The later studies have been conducted in a variety of environments. In some cases, the differences between these more contemporary open and traditional classrooms are far less drastic than the differences between the two types of English classrooms. In other cases, a change to open education either has been made with little understanding or acceptance of the underlying philosophy, or has been imposed by administrators, regardless of teachers' views. In other words, many of the classrooms studied were run by traditionally trained teachers who had selectively adopted some, but not all, of the features of open education.

Some of the schools studied had only recently changed to the open-classroom approach. Research has shown them to be less effective (73)—oftentimes teachers who wish to change are not able to do so effectively (8), and the changes that do occur are usually gradual. Even if teachers are able to change their practices quickly, children take time to gain full benefits.

Keeping these limitations of the classroom data in mind, we can offer one viable explanation for any superiority that open classrooms do, in fact, enjoy. The relative lack of extrinsic constraints in the open environment

encourages intrinsic task motivation. Instead of concerning themselves with pleasing the teacher, doing better than other students, and meeting deadlines, children can concentrate their efforts on playful and innovative exploration with materials and ideas.

Future studies must look specifically at the elements in open education that researchers such as ourselves have linked to increases in intrinsic motivation and creative performance—elements that allow students to take control of the learning experience. Present findings lead us to conclude that the amount of freedom children experience in the classroom has an impact on their creative ability. Much of this evidence does, in fact, favor open classrooms.

Creativity and Play

One possible benefit of an environment free from excessive social constraint, such as the open classroom, is that the individual can approach each task with an intellectual playfulness and a deep level of involvement. Several theorists have proposed that play (and the social conditions that facilitate play) can have beneficial effects on creativity (13, 40, 56). Much of the research attempting to link play to creativity has involved either laboratory training in play or opportunities to engage in play, followed by creativity testing. In one such investigation (22), children who were trained in play showed more creativity than did children in several control (nonplay) groups. Other research found that children who were allowed to play with a set of objects subsequently developed more original ideas for alternate uses for the objects than did either children in control conditions or children asked to imitate an experimenter's activities with the play objects (20, 21, 38). In an even more impressive demonstration of the facilitative effects of play on creativity (63), four-year-old children in one condition were allowed to play with blocks and sticks before a testing session began. Children in other conditions either received training on how to join the blocks and sticks or proceeded directly to the testing. The first test required them to join two sticks with a block, and a second to join three sticks with a block. Although both the play and the training groups performed better than did the control group on the first test, the play group surpassed both the others in solving the more difficult problem.

Most of the researchers who conducted these studies assume that free play or make-believe play facilitates creativity, not only because play gives children the opportunity to discover new properties of objects but also because play stimulates fantasy, which, in turn, makes creativity more likely. In a study designed to test this assumption (19), preschool children were first unobtrusively observed and classified as "players" (spontaneously engaging in make-believe play) or "nonplayers." They were then exposed to one of three treatment conditions: (1) free play with a set of

objects, (2) imitation of an experimenter's actions with objects, or (3) straightforward problem solving with objects. Free play did enhance childrens' ideational fluency above the levels of those in the other two conditions—but only for the "players," those children who habitually engaged in make-believe play.

These results suggest that engaging in fantasy might, in itself, lead to increases in creativity. While only a few studies have examined this possibility directly, one of our investigations (66) has explored the relationship between short-term fantasy and creativity in 47 young children. We administered Barron's Movement Threshold Inkblot Test (9) as a measure of fantasy ability. This test presents 28 inkblots in which it becomes progressively easier to see human movement. Singer (62) has found that the ability to see human movement on this test predicts other scores of imaginative ability. In our study, we found significant correlations between this test and both collage-making creativity and creativity on an unusual uses test.

Finally, Hershey and Kearns (32) conducted a fantasy-training study during an eight-week program for elementary school children. Half of the children were randomly assigned to one hour of training in relaxation and guided fantasy per week, while the other children participated in an hour of arithmetical exercises. At the end of the program, the training group scored significantly higher on fluency, flexibility, and originality on the Torrance Tests than did the children in the control group.

This research suggests that teachers can encourage children's creativity by giving them ample opportunity for free play with various materials and by allowing them to engage in fantasy whenever possible.

TEACHING CHILDREN TO THINK CREATIVELY

We have been focusing primarily on the pervasive, everyday factors in classrooms that can influence children's creativity by influencing their intrinsic motivation—factors such as reward, competition, choice, independence, and free play. However, it is important to point out that there are many programs designed to *directly teach* children to think creatively. These programs focus not on intrinsic task movitation but on creativity-relevant skills.

Programs are currently available in a wide variety of forms, and it would be impossible to describe them all in the context of this monograph. One excellent information source is a review written by E. Paul Torrance entitled "Can We Teach Children to Think Creatively?" (69). In this article, Torrance reports that the most popular attempts to increase student creativity have included (1) the use of complex programs involving

packages of materials, (2) the manipulation of teacher-classroom variables, and (3) the use of modifications of the Osborn-Parnes Creative Problem Solving training program—an approach that allows for a great deal of student involvement, practice, and interaction with teachers (52, 54, 55). Teachers have particularly favored the third procedure. Programs involving the creative arts and packages of materials, media reading, and motivation, as well as those that facilitate testing conditions have also been relatively popular. Examples of interventions falling into this category include:

1. The Covington, Crutchfield, and Davies Productive Thinking Program (17)
2. The Purdue Creative Thinking Program (23)
3. The Myers and Torrance ideabooks (45, 46, 47, 48, 49)
4. *Synectics* and *Making It Strange* (27, 28)
5. The Silver-Burdett Science Program, K-6.

Interventions that use one or more of the creative arts to teach children to think creatively have been rather effective, although less so than the majority of the programs already described. And, in addition, a number of reading programs are available that have been designed specifically with creativity in mind (see 15 and 16 for representative examples of this approach).

Finally, over the past few years, a number of programs and competitions have been organized to promote creative thinking in classrooms by focusing on the invention process. For example, educators associated with the Buffalo Public Schools have instituted Talents Unlimited—a program designed to promote critical and creative thinking skills at all grade levels. Also originating in Buffalo is the Program for Young Inventors, which provides unique opportunities for young children to synthesize and apply their knowledge, skills, and other creative talents through the invention process.

In New Jersey, the Division of Vocational Education offers a statewide Mini Invention/Innovation Team (MIIT) contest, which gives kindergarteners through ninth graders an opportunity to develop and apply practical problem-solving skills and creativity. From Ohio come both the Toledo Invention Program and the Patent Pending Program of the Inventors Council of Dayton. The publishers of *Weekly Reader* offer a national invention contest, and, on an even broader scale, the Olympics of the Mind Association sponsors creative competitions from regionals to world finals.

Clearly, given the research results reported earlier, we would caution against using strongly competitive situations to encourage children's creativity. In any attempt to stimulate creative behavior, however, perhaps the most important effect comes from the implicit message that children receive: We, your teachers, value creativity. We welcome your creative

ideas, and we will support your efforts to become more creative. Such messages, if they are taken as clear and sincere, can only have positive effects on children's creativity.

CONCLUSION

After becoming familiar with the current research on the destruction of children's creativity and on the intervention programs designed to enhance creativity, what do you do next to develop student creativity? We can summarize our earlier discussions with a list of suggestions:

1. Remember that children will be most creative when they enjoy what they are doing.
2. Use tangible rewards as seldom as possible; instead, encourage children's own pride in the good work they have done.
3. Avoid setting up competitive situations for children.
4. Downplay your evaluation of children's work; instead, lead them to become more proficient at recognizing their own strengths and weaknesses.
5. Encourage children to monitor their own work, rather than to rely on your surveillance over them.
6. Whenever possible, give children choices about what activities they do and about how to do those activities.
7. Make intrinsic motivation a conscious factor of your discussions with children; encourage them to become aware of their own special interests and to take their focus *off* the extrinsics.
8. In order to build children's intrinsic motivation and creativity, help them build their self-esteem, help them focus on and appreciate their own unique talents and strengths.
9. As much as possible, encourage children to become active, independent learners rather than to rely on you for constant direction. Encourage them to take confident control of their own learning process.
10. Give children ample opportunities for free play with various materials, and allow them to engage in fantasy whenever possible.
11. In any ways you can, show children that you value creativity—that not only do you allow it but also you actively engage in it.
12. Whenever you can, show your students that *you* are an intrinsically motivated adult who enjoys thinking creatively.

Of course, as sound as they may be, these suggestions are much easier to make than to implement. Many of them are impossible to carry out in their pure form. The realities of most school systems mitigate against

eliminating all sources of evaluation, reward, and choice restriction from the classroom curriculum. Administrators, parents, and even the students themselves are invested in these systems, and it will be a long time before the majority of them are willing to give these up entirely. While we advocate that educators continue to work toward that end, we hasten to add that a great deal can be done right now on an individual, classroom-by-classroom basis to maintain intrinsic motivation and to foster student creativity.

For example, carefully examine your instructional approach and ask yourself whether any restrictions, rewards, evaluations, or competitive elements might reasonably be eliminated from the school day. In situations in which reward or evaluation components do seem necessary, we suggest substituting self-evaluation or self-reward systems for the more usual teacher-centered paradigms. Help children to focus on the intrinsically enjoyable aspects of what they do. Actually talk with them about what they find interesting or fun about school.

Capitalize on students' interests and structure lessons around popular topics. Take advantage of the many formalized programs designed to foster creativity in the classroom (only a few of which have been mentioned here). Consider adding some features of the open classroom to your own routine—always with an eye toward increasing students' sense of control over their day. Talk with colleagues, parents, and administrators, and enlist all those who are interested in a movement to increase students' intrinsic motivation and creativity. Finally, let the children themselves know that you deeply value creativity. Share with them your own interests, hobbies, and passions. Set as a primary goal the development of your own personal creativity. Your example will go far toward motivating your students to do the same.

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